REMARKS

The Office Action dated March 2, 2005 has been carefully reviewed and the forgoing amendment and following remarks have been made in consequence thereof.

Claims 1-3, 6-7, 9-13, 16-17, 19-24, 26, and 28-29 are pending in this application. Claims 1-4, 6-14, 16-24, and 26-29 stand rejected. Claims 4, 5, 8, 14, 15, 18, 25, and 27 have been canceled without prejudice, waiver, or disclaimer. Claims 1, 7, 10, 11, 17, 20, 21, 26, and 29 have been amended. No new matter has been added.

The rejection of Claims 1, 3, 4, and 6-10 under 35 U.S.C. § 102(b) as being anticipated by Smith et al. (U.S. Patent 5,841,272) is respectfully traversed.

Smith et al. describe an electrical device including a conductive means having a first current path (26) and a second current path (28). The electrical device is suited for sensing current flowing through an electrical circuit. Since each path's resistance can be directly proportional to its length when a cross-section of each path is held constant, the length of the second current path can be varied with respect to the first current path to achieve a desired fixed proportional relationship. A current sensing element (32) is provided for measuring an output signal of a current which is flowing in the second current path regardless of operating frequency of the electrical circuit.

Claim 1 recites a current sensor for an apparatus, the current sensor comprising "a conductor comprising an aperture therethrough and a plurality of Hall effect devices inserted at least partially within said aperture, said conductor is configured to generate a magnetic field having a pre-determined shape, each said Hall effect device configured to detect said pre-determined shape and generate an output, and each said Hall effect device configured to be insensitive to magnetic fields having shapes other than the pre-determined shape."

Smith et al. does not describe nor suggest a current sensor as recited in Claim 1. Specifically, Smith et al. does not describe nor suggest a current sensor including a conductor including an aperture therethrough and a plurality of Hall effect devices inserted at least partially within the aperture, each Hall effect device configured to be insensitive to magnetic fields having shapes other than the pre-determined shape. Rather, Smith et al. describe a current sensing element provided for measuring an output signal of a current which is flowing

in a second current path of a conductive means regardless of an operating frequency of an electrical circuit. A current sensed by the current sensing element flows through the electrical circuit. Accordingly, Smith et al. does not describe nor suggest a current sensor including a Hall effect device configured to be insensitive to magnetic fields having shapes other than the pre-determined shape. For the reasons set forth above, Claim 1 is submitted to be patentable over Smith et al.

Claims 4 and 8 have been canceled. Claims 3, 6, 7, and 9 depend from independent Claim 1. When the recitations of Claims 3, 6, 7, and 9 are considered in combination with the recitations of Claim 1, Applicants submit that dependent Claims 3, 6, 7, and 9 likewise are patentable over Smith et al.

Claim 10 recites a current sensor for an apparatus comprising "a conductor comprising an aperture therethrough and a plurality of Hall effect devices inserted at least partially within said aperture, said conductor is configured to generate a magnetic field comprising at least a first magnetic field component having a first direction and a second magnetic field component having a second direction different from said first direction, and a pre-determined shape, each said Hall effect device configured to detect said pre-determined shape and generate an output, and each said Hall effect device configured to be insensitive to magnetic fields having spatial dependencies other than a spatial dependence defined by the pre-determined shape."

Smith et al. does not describe nor suggest a current sensor as recited in Claim 10. Specifically, Smith et al. does not describe nor suggest a conductor including an aperture therethrough and a plurality of Hall effect devices inserted at least partially within the aperture, each Hall effect device configured to be insensitive to magnetic fields having spatial dependencies other than a spatial dependence defined by the pre-determined shape. Rather, Smith et al. describe a current sensing element provided for measuring an output signal of a current which is flowing in a second current path of a conductive means regardless of an operating frequency of an electrical circuit. A current sensed by the current sensing element flows through the electrical circuit. Accordingly, Smith et al. does not describe nor suggest a current sensor including a Hall effect device configured to be insensitive to magnetic fields having spatial dependencies other than a spatial dependence defined by the pre-determined

shape. For the reasons set forth above, Claim 10 is submitted to be patentable over Smith et al..

For at least the reasons set forth above, Applicants respectfully request that the Section 102 rejection of Claims 1, 3-4 and 6-10 be withdrawn.

The rejection of Claim 2 under 35 U.S.C. § 103(a) as being unpatentable over Smith et al. in view of Dames et al. (U.S. Patent 6,414,475) is respectfully traversed.

Smith et al. is described above. Dames et al. describe a system in which a plurality of coils in a current sensor are arranged in a particular manner. The coils are arranged so that their magnetic axis are co-located and aligned together. The coils are also arranged so that they provide a null response to extraneous magnetic fields having a field gradient. The current sensor is used as part of a fiscal electricity meter. It is particularly important that the meter is not unduly sensitive to an influence of extraneous magnetic fields. The current sensor includes a sensor printed circuit board (PCB) (5) on which is formed a current sensing coil (4) including a sense portion (6) and a cancellation portion (7). Since turns area products of the sense portion and the cancellation portion are substantially the same, an electromotive force (EMF) induced in the sense portion in response to a distant time-varying magnetic field will cancel out with the EMF induced in the cancellation portion in response to the same distant time-varying magnetic field. Therefore, the current sensor is relatively immune to interference from background magnetic fields.

Claim 2 depends from independent Claim 1 which recites a current sensor for an apparatus, the current sensor comprising "a conductor comprising an aperture therethrough and a plurality of Hall effect devices inserted at least partially within said aperture, said conductor is configured to generate a magnetic field having a pre-determined shape, each said Hall effect device configured to detect said pre-determined shape and generate an output, and each said Hall effect device configured to be insensitive to magnetic fields having shapes other than the pre-determined shape."

Neither Smith et al. nor Dames et al., considered alone or in combination, describe nor suggest a current sensor as recited in Claim 1. Specifically, neither Smith et al. nor Dames et al., considered alone or in combination, describe nor suggest a current sensor including a conductor including an aperture therethrough and a plurality of Hall effect

devices inserted at least partially within the aperture, each Hall effect device configured to be insensitive to magnetic fields having shapes other than the pre-determined shape. Rather, Smith et al. describe a current sensing element provided for measuring an output signal of a current which is flowing in a second current path of a conductive means regardless of an operating frequency of an electrical circuit. A current sensed by the current sensing element flows through the electrical circuit. Dames et al. describe a current sensor that includes a sensor printed circuit board (PCB) on which is formed a current sensing coil including a sense portion and a cancellation portion. Since turns area products of the sense portion and the cancellation portion are substantially the same, an electromotive force (EMF) induced in the sense portion in response to a distant time-varying magnetic field cancels out with the EMF induced in the cancellation portion in response to the same distant time-varying magnetic field. Therefore, the current sensor in Dames et al. is relatively immune to interference from background magnetic fields. The current sensor in Dames et al. is also a part of a meter that is not unduly sensitive to an influence of extraneous magnetic fields. The current sensor in Dames et al. further includes a plurality of coils that are arranged so that they provide a null response to extraneous magnetic fields having a field gradient. Accordingly, neither Smith et al. nor Dames et al., considered alone or in combination, describe nor suggest a current sensor including a Hall effect device configured to be insensitive to magnetic fields having shapes other than the pre-determined shape. For the reasons set forth above, Claim 1 is submitted to be patentable over Smith et al. in view of Dames et al.

When the recitations of Claim 2 are considered in combination with the recitations of Claim 1, Applicants submit that dependent Claim 2 likewise is patentable over Smith et al. in view of Dames et al.

For the reasons set forth above, Applicants respectfully request that the Section 103 rejection of Claim 2 be withdrawn.

The rejection of Claims 11-14, 16-24, and 26-29 under 35 U.S.C. § 103(a) as being unpatentable over Plis et al. (U.S. Patent 5,854,995) in view of Smith et al. is respectfully traversed.

Plis et al. describe a vector electricity meter. The meter includes a voltage sensor (110) and a current sensor (120) that sense voltage and current signals on a power line and input the sensed voltages and currents (315) into a converting means (320). Smith et al. is described above.

Claim 11 recites a residential electricity meter including "a voltage sensor and a current sensor, said current sensor comprising a conductor comprising an aperture therethrough and a plurality of Hall effect devices inserted at least partially within said aperture, said conductor is configured to generate a magnetic field having a pre-determined shape, each said Hall effect device configured to detect said pre-determined shape and generate an output, and each said Hall effect device configured to be insensitive to magnetic fields having shapes other than the pre-determined shape."

Neither Plis et al. nor Smith et al., considered alone or in combination, describe nor suggest a residential electricity meter as recited in Claim 11. Specifically, neither Plis et al. nor Smith et al., considered alone or in combination, describe nor suggest a residential electricity meter including a current sensor, the current sensor including a conductor including an aperture therethrough and a plurality of Hall effect devices inserted at least partially within the aperture, each Hall effect device configured to be insensitive to magnetic fields having shapes other than the pre-determined shape. Rather, Plis et al. describe a meter that includes a current sensor that senses current signals on a power line. Smith et al. describe a current sensing element provided for measuring an output signal of a current which is flowing in a second current path of a conductive means regardless of an operating frequency of an electrical circuit. A current sensed by the current sensing element flows through the electrical circuit. Accordingly, neither Plis et al. nor Smith et al., considered alone or in combination, describe nor suggest a current sensor including a Hall effect device configured to be insensitive to magnetic fields having shapes other than the pre-determined shape. For the reasons set forth above, Claim 11 is submitted to be patentable over Plis et al. in view of Smith et al.

Claims 14 and 18 have been canceled. Claims 12, 13, 16, 17, and 19 depend from independent Claim 11. When the recitations of Claims 12, 13, 16, 17, and 19 are considered in combination with the recitations of Claim 11, Applicants submit that dependent Claims 12, 13, 16, 17, and 19 likewise are patentable over Plis et al. in view of Smith et al.

Claim 20 recites a residential electricity meter comprising "a voltage sensor and a current sensor, said current sensor comprising a conductor comprising an aperture therethrough and a plurality of Hall effect devices inserted at least partially within said aperture, said conductor is configured to generate a magnetic field comprising at least a first magnetic field component having a first direction and a second magnetic field component having a second direction different from said first direction, and a pre-determined shape, each said Hall effect device configured to detect said pre-determined shape and generate an output, and each said Hall effect device configured to be insensitive to magnetic fields having spatial dependencies other than a spatial dependence defined by the pre-determined shape."

Neither Plis et al. nor Smith et al., considered alone or in combination, describe nor suggest a residential electricity meter as recited in Claim 20. Specifically, neither Plis et al. nor Smith et al., considered alone or in combination, describe nor suggest a residential electricity meter including a current sensor, the current sensor including a conductor including an aperture therethrough and a plurality of Hall effect devices inserted at least partially within the aperture, each Hall effect device configured to be insensitive to magnetic fields having spatial dependencies other than a spatial dependence defined by the pre-determined shape. Rather, Plis et al. describe a meter that includes a current sensor that senses current signals on a power line. Smith et al. describe a current sensing element provided for measuring an output signal of a current which is flowing in a second current path of a conductive means regardless of an operating frequency of an electrical circuit. A current sensed by the current sensing element flows through the electrical circuit. Accordingly, neither Plis et al. nor Smith et al., considered alone or in combination, describe nor suggest a current sensor including a Hall effect device configured to be insensitive to magnetic fields having spatial dependencies other than a spatial dependence defined by the pre-determined shape. For the reasons set forth above, Claim 20 is submitted to be patentable over Plis et al. in view of Smith et al.

Claim 21 recites a method for sensing voltage and current in a residence, the method comprising "providing an electricity meter comprising: a voltage sensor; and a current sensor, wherein the current sensor comprises a conductor comprising an aperture therethrough and a plurality of Hall effect devices inserted at least partially within the aperture, wherein the conductor is configured to generate a magnetic field having a pre-determined shape, each

Hall effect device is configured to detect the pre-determined shape and generate an output, and each said Hall effect device configured to be insensitive to magnetic fields having shapes other than the pre-determined shape."

Neither Plis et al. nor Smith et al., considered alone or in combination, describe nor suggest a method for sensing voltage and current as recited in Claim 21. Specifically, neither Plis et al. nor Smith et al., considered alone or in combination, describe nor suggest providing an electricity meter including a current sensor, where the current sensor includes a conductor including an aperture therethrough and a plurality of Hall effect devices inserted at least partially within the aperture, and each Hall effect device configured to be insensitive to magnetic fields having shapes other than the pre-determined shape. Rather, Plis et al. describe a meter that includes a current sensor that senses current signals on a power line. Smith et al. describe a current sensing element provided for measuring an output signal of a current which is flowing in a second current path of a conductive means regardless of an operating frequency of an electrical circuit. A current sensed by the current sensing element flows through the electrical circuit. Accordingly, neither Plis et al. nor Smith et al., considered alone or in combination, describe nor suggest a current sensor including a Hall effect device configured to be insensitive to magnetic fields having shapes other than the pre-determined shape. For the reasons set forth above, Claim 21 is submitted to be patentable over Plis et al. in view of Smith et al.

Claim 27 has been canceled. Claims 22-24, 26, and 28 depend from independent Claim 21. When the recitations of Claims 22-24, 26, and 28 are considered in combination with the recitations of Claim 21, Applicants submit that dependent Claims 22-24, 26, and 28 likewise are patentable over Plis et al. in view of Smith et al.

Claim 29 recites a method for sensing voltage and current in a residence, the method comprising "providing a residential electricity meter comprising: a voltage sensor; and a current sensor, said current sensor comprising a conductor comprising an aperture therethrough and a plurality of Hall effect devices inserted at least partially within said aperture, said conductor is configured to generate a magnetic field comprising at least a first magnetic field component having a first direction and a second magnetic field component having a second direction different from said first direction, and a pre-determined shape, each said Hall effect device configured to detect said pre-determined shape and generate an output,

and each said Hall effect device configured to be insensitive to magnetic fields having shapes other than the pre-determined shape."

Neither Plis et al. nor Smith et al., considered alone or in combination, describe nor suggest a method for sensing voltage and current as recited in Claim 29. Specifically, neither Plis et al. nor Smith et al., considered alone or in combination, describe nor suggest providing a residential electricity meter including a current sensor, the current sensor including a conductor including an aperture therethrough and a plurality of Hall effect devices inserted at least partially within the aperture, and each Hall effect device configured to be insensitive to magnetic fields having shapes other than the pre-determined shape. Rather, Plis et al. describe a meter that includes a current sensor that senses current signals on a power line. Smith et al. describe a current sensing element provided for measuring an output signal of a current which is flowing in a second current path of a conductive means regardless of an operating frequency of an electrical circuit. A current sensed by the current sensing element flows through the electrical circuit. Accordingly, neither Plis et al. nor Smith et al., considered alone or in combination, describe nor suggest a current sensor including a Hall effect device configured to be insensitive to magnetic fields having shapes other than the pre-determined shape. For the reasons set forth above, Claim 29 is submitted to be patentable over Plis et al. in view of Smith et al.

For the reasons set forth above, Applicants respectfully request that the Section 103 rejection of Claims 11-14, 16-24, and 26-29 be withdrawn.

Moreover, Applicants respectfully submit that the Section 103 rejections of Claims 2, 11-14, 16-24, and 26-29 are not proper rejections. As is well established, obviousness cannot be established by combining the teachings of the cited art to produce the claimed invention, absent some teaching, suggestion, or incentive supporting the combination. None of Smith et al, Dames et al., or Plis et al., considered alone or in combination, describe or suggest the claimed combination. Furthermore, in contrast to the assertion within the Office Action, Applicants respectfully submit that it would not be obvious to one skilled in the art to combine Smith et al with Dames et al. or Plis et al. because there is no motivation to combine the references suggested in the cited art itself.

As the Federal Circuit has recognized, obviousness is not established merely by combining references having different individual elements of pending claims. Ex parte Levengood, 28 U.S.P.Q.2d 1300 (Bd. Pat. App. & Inter. 1993). MPEP § 2143.01. Rather, there must be some suggestion, outside of Applicants' disclosure, in the prior art to combine such references, and a reasonable expectation of success must be both found in the prior art, and not based on Applicants' disclosure. In re Vaeck, 20 U.S.P.Q.2d 1436 (Fed. Cir. 1991). In the present case, neither a suggestion or motivation to combine the prior art disclosures, nor any reasonable expectation of success has been shown.

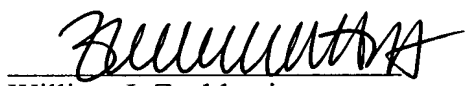
Furthermore, it is impermissible to use the claimed invention as an instruction manual or "template" to piece together the teachings of the cited art so that the claimed invention is rendered obvious. Specifically, one cannot use hindsight reconstruction to pick and choose among isolated disclosures in the art to deprecate the claimed invention. Further, it is impermissible to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art. The present Section 103 rejections are based on a combination of teachings selected from multiple patents in an attempt to arrive at the claimed invention. Specifically, Smith et al. teach a current sensing element provided for measuring an output signal of a current which is flowing in a second current path of a conductive means regardless of an operating frequency of an electrical circuit. A current sensed by the current sensing element flows through the electrical circuit. Dames et al. teach a current sensor that includes a sensor printed circuit board (PCB) on which is formed a current sensing coil including a sense portion and a cancellation portion. Since turns area products of the sense portion and the cancellation portion are substantially the same, an electromotive force (EMF) induced in the sense portion in response to a distant time-varying magnetic field cancels out with the EMF induced in the cancellation portion in response to the same distant time-varying magnetic field. Therefore, the current sensor in Dames et al. is relatively immune to interference from background magnetic fields. The current sensor in Dames et al. is also a part of a meter that is not unduly sensitive to an influence of extraneous magnetic fields. The current sensor in Dames et al. further includes a plurality of coils that are arranged so that they provide a null response to extraneous magnetic fields having a field gradient. Plis et al. teach a meter that includes a current sensor that senses current signals on a power line. Since there is no teaching nor suggestion in the cited art for the combination,

the Section 103 rejections appear to be based on a hindsight reconstruction in which isolated disclosures have been picked and chosen in an attempt to deprecate the present invention. Of course, such a combination is impermissible, and for this reason alone, Applicants request that the Section 103 rejections of Claims 2, 11-14, 16-24, and 26-29 be withdrawn.

For at least the reasons set forth above, Applicants respectfully request that the rejections of Claims 2, 11-14, 16-24, and 26-29 under 35 U.S.C. 103(a) be withdrawn.

In view of the foregoing remarks, all the claims now active in this application are believed to be in condition for allowance. Reconsideration and favorable action is respectfully requested.

Respectfully Submitted,



William J. Zychlewicz
Registration No. 51,366
ARMSTRONG TEASDALE LLP
One Metropolitan Square, Suite 2600
St. Louis, Missouri 63102-2740
(314) 621-5070